GRAPHING ASSIGNMENT

DUE DATE: _____ **NAME:** Solutions

Using your knowledge of graphing polynomial equations, even and odd functions, factoring and roots, graph the following functions. Show all calculations and work in the space provided.

1. $y = x^4 + x^3 - 8x^2 - 2x + 12$

$f(2) = 16 + 8 - 8(4) - 4 + 12$
$= 36 - 36$
$= 0$

$\therefore x-2$ is a factor

$$\begin{array}{r|rrrrr} 2 & 1 & 1 & -8 & -2 & 12 \\ & & 2 & 6 & -4 & -12 \\ \hline & 1 & 3 & -2 & -6 & 0 \end{array}$$

$x^3 + 3x^2 - 2x - 6$

$= x^2(x+3) - 2(x+3)$ ← factor by grouping

$= (x^2-2)(x+3)$

$\boxed{y = (x-2)(x^2-2)(x+3)}$

x-intercepts ← set $y=0$

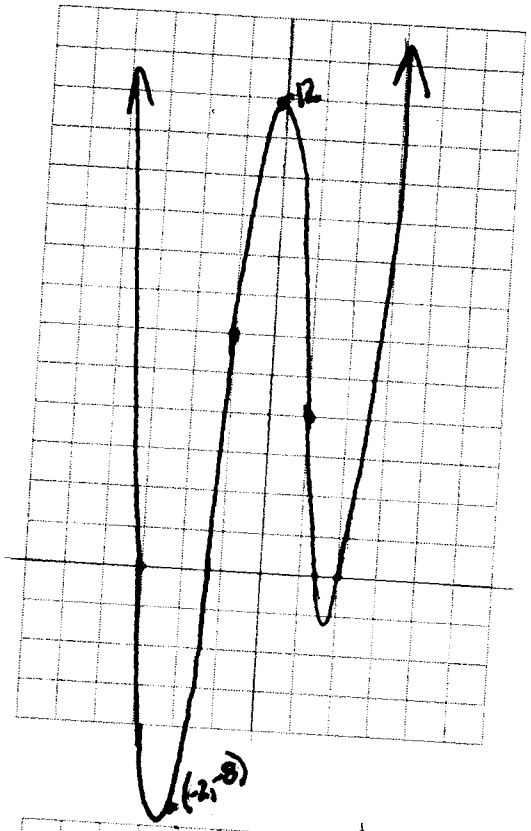
$(x-2)(x^2-2)(x+3) = 0$

$x = 2, -3, \sqrt{2}, -\sqrt{2}$

$x = 2, -3, 1.41, -1.41$

y-intercept ← set $x=0$

$y = (-2)(-2)(3)$
$= 12$



2. $y = x^4 - 6x^3 + 9x^2 + 4x - 12$

$f(-1) = (-1)^4 - 6(-1)^3 + 9(-1)^2 + 4(-1) - 12$
$= 1 + 6 + 9 - 4 - 12$
$= 0$

$\therefore x+1$ is a factor

$$\begin{array}{r|rrrrr} -1 & 1 & -6 & 9 & 4 & -12 \\ & & -1 & 7 & -16 & 12 \\ \hline & 1 & -7 & 16 & -12 & 0 \end{array}$$

$x^3 - 7x^2 + 16x - 12$

$f(2) = (2)^3 - 7(2)^2 + 16(2) - 12$
$= 8 - 28 + 32 - 12$
$= 0$

$\therefore (x-2)$ is a factor

$$\begin{array}{r|rrrr} 2 & 1 & -7 & 16 & -12 \\ & & 2 & -10 & 12 \\ \hline & 1 & -5 & 6 & 0 \end{array}$$

$x^2 - 5x + 6$

$(x-3)(x-2)$

$\boxed{y = (x+1)(x-2)(x-3)(x-2)}$

x-intercepts

$x = -1, 2, 3$

y-intercept

$y = (1)(-2)(-3)(-2)$
$= -12$